

REMARKS

Claims 1-20 were presented for examination, are pending and are rejected.

Reconsideration is respectfully requested.

The 35 U.S.C. 103(a) Rejections

Claims 1-3, 5-8, 11-18 and 20 are rejected as being unpatentable over Meissner et al. (5936984) in view of Peressini (6418156). The rejection is respectfully traversed.

As discussed in the attached declaration and Appeal Brief, which are fully incorporated herein by reference, Meissner et al. (US 5,936,984), of which the declarant is a co-inventor, discloses a laser rod design with a polished barrel; however, the reference only has a taper or flange on the undoped portion of the laser rod near the laser rod's two ends, while the applicants' invention explicitly claims a taper over the entire doped length of the laser rod.

The Peressini patent (US 6,418,156 B1) shows a laser rod tapered along its length (Fig. 11); however, this is not related to parasitic suppression, which is the reason the applicants' laser rods are tapered. Peressini places a taper on the various laser gain elements to maximize the path length of the pump rays within the gain medium, which can be advantageous for some specific classes of laser as it permits lower doping densities of lasant ions to be effectively utilized. There are two major differences between the structures claimed by Peressini and those claimed by the applicants:

1. The structures in the Peressini patent are all constructed so that the pump radiation is introduced into the gain medium in a direction transverse to the laser axis, whereas the applicants' tapered laser rods are all constructed so that the pump radiation is introduced substantially parallel to the laser axis.

2. The structures in Perisini control ASE and parasitics through the use of special optical coatings on the transverse sides of their gain elements. Throughout the discussion in the Peressini patent it is emphasized that the purpose of the coatings is two fold. The coatings are intended to either absorb or efficiently out couple ASE from the laser gain media, as well as confine the pump radiation to the laser rod via high efficiency reflection. See column 17, lines 18-24. However, the applicants' laser rods are specifically uncoated on their transverse side; they efficiently transport ASE from the laser rod where it develops to the ends of the laser rod where the ASE is quenched in the endcaps. See, e.g., page 2, lines 9-11. Claims 1, 12 and 16 have been amended to clarify that the laser rods are uncoated. Therefore the rejection should be withdrawn.

Claims 4, 9, 10 and 19 are rejected as being unpatentable over Meissner et al. (5936984) and Peressini (6418156) as applied to claims 1-3, 5-8, 11-18 and 20 above, and further in view of Tang (6263007). The rejection is respectfully traversed.

The rejection should be withdrawn because claims 4, 9 and 10 depend from independent claim 1 and claim 19 depends from independent claim 16. Claims 1 and 16 should be allowable as discussed above.

Further, Tang (US 6,263,007 B1) contains a diagram showing a tapered gain volume (Fig. 9), but this is unrelated to the applicants' tapered laser rod. The most important difference between the tapered gain volume in Tang and the applicants' tapered laser rod is that the tapered region in Tang is a low refractive index region (near unity, containing a gaseous medium), while the surrounding medium does not even have to be optically transparent at the laser wavelength. In the applicants' tapered laser rod, the rod itself has to have higher refractive index than the surrounding medium, and the surrounding medium (typically cooling water or air) is also required to be optically transparent at both the pump and the laser wavelengths. The reason for the tapers in the Tang patent are to pinch down the optical cavity so as to only permit lasing to occur in the fundamental (or $TEM_{0,0}$) mode – a technique known as spatial filtering in the laser scientific and technical literature. There is no connection between ASE and parasitic management and the use of tapered laser regions in the Tang patent.

Therefore the rejection should be withdrawn.

Conclusions

It is submitted that this application is in condition for allowance based on claims 1-20 in view of the amendments thereto, the attached declaration and the foregoing comments.

If any impediments remain to prompt allowance of the case, please contact the undersigned at 808-270-1011.

Respectfully submitted,


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